

## The trade in beer to medieval Scandinavia

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## THE TRADE IN BEER TO MEDIEVAL SCANDINAVIA<sup>1</sup>

BY RICHARD W. UNGER

All speakers of Germanic languages were and are reputed to be great consumers of beer. The Vikings especially have become known for their beer drinking but not just early medieval Scandinavians were noted for their consumption of malt beverages. Beer was around long before the German tribes made their appearance in northern and central Europe. The earliest evidence for production and consumption comes from ancient Mesopotamia. Malting of grain may have even pre-dated the literate period and Babylonians were producing beer certainly by 3500 B.C. Women appear to have been the brewers in that era. Beer was associated with a specific goddess. The brewsters made a number of different types of beer and the same was true in Egypt. Descriptions of some of the variations dated to the first millennium B.C. have survived. Mesopotamians by that time even brewed beer with hops. Brewing did not disappear with the Roman Empire though wine was the preferred drink. Gauls and Syrians still produced and drank beer and its use outlasted the Empire itself, beer consumption being mentioned in Britain and Ireland in the early Middle Ages.<sup>2</sup>

Beer had little competition among the German tribes in that period. Wine had to be imported from the south and it was a luxury good. Production of wine came to Scandinavia only slowly and that with conversion to Christianity since priests needed the drink for celebrating the Mass. What was produced there was certainly not as good as the wine that came from the Rhine Valley or from France. The lands of the Teutonic Order in East Prussia even produced wine by the High Middle Ages but it had to be sweetened with honey. The only real alternative to beer in medieval Scandinavia was mead, a drink made from fermenting honey in solution with water. In areas where honey was abundant the drink was popular, certainly more for its ability to intoxicate than for its food value. Consumption of mead declined as beer-drinking spread though it held on in parts of the North into the eighteenth century where raw material was easy to get.<sup>3</sup> A ninth century traveller to East Prussia said that there powerful men drink mare's milk while the poor and slaves drink mead and that there was plenty of mead but no ale brewed.<sup>4</sup> In »Beowulf« the heroes may have joined together to drink in the mead hall but by the Viking Age beer was the drink for celebrations, festivities and even for daily consumption. Beer had some religious significance. Odin, Thor and all the other heroes in Valhalla were beer drinkers, so it was said. Icelandic sagas offer many instances of wedding feasts where the guests drank beer and parties where the drinking horn was passed. The saga writers mention both *alu* or *öl*, that is ale, and *bior* or *bjorr*,

that is beer. Beer drinking is mentioned in the »Edda« as well. The beer must have had a unique taste since the malt was sometimes smoked, that is dried in the smoke of the open fires which burned in the pits in the middle of houses.<sup>5</sup> The farmhouses of landowners would have had facilities for making beer and members of the household had making beer as part of their normal responsibilities. In taking up the production of beer Scandinavia fell behind the pattern in lands to the south. In fact throughout the Middle Ages and even as late as the nineteenth century Scandinavia proved backward in the development of brewing production and technology. It was only after about 1850 that there was a change and brewers in Denmark especially became leaders in advances in the industry.

Brewing began in Scandinavia as in other places in Europe as a domestic occupation. Producing beer in the home was one of the tasks of the women of the household. That was not true further east, in Russia, east Finland, Estonia, Latvia and Lithuania where men did the job.<sup>6</sup> The literary evidence shows that Scandinavians at least from about 800 drank beer but none of that evidence describes how they made the beer. Knowledge of domestic brewing practices in the Middle Ages comes rather from ethnographic studies. For brewing there are two excellent works, Odd Nordlund's »Brewing and Beer Traditions in Norway« and Matti Räsänen's »Vom Halm zum Faß«. The former author, whose work was a model for the latter, investigated brewing methods in rural Norway by questioning farmers about established practice. The questionnaires circulated in the 1960's give, Nordlund thinks, an accurate picture of brewing practice from about 1850 to about 1880. Many of his findings probably applied to much earlier periods as well. For example he found that some farmers set aside a barley patch where they cultivated what they called ale grain. Brewing could not be done in one night or one day but took some time and so had to be planned in advance.<sup>7</sup> Obviously there are serious problems with projecting his results back in time but he concluded that:

*The study of brewing traditions has so far provided an impressive picture of the high degree of stability characteristic of this activity. The tools used, and the materials selected, are all integrated into local work techniques, aims of production, grain supplies, and into the psychological attitudes towards the grain available for brewing. There seem to be no sudden changes in these processes, as is to be expected in a sphere where taste and social convention are the regulating elements.*<sup>8</sup>

Räsänen had a smaller sample to work from with information spread over a longer period of time. Yet he too concluded that the technical process of brewing for the Baltic area was relatively uniform and was, all things considered, rather stable.<sup>9</sup> Nordlund, in spite of the variations by district and variety in practice which he discovered, could still say that, *Ale brewing is an activity deeply integrated in peasant society ... Because of local preferences and tastes, the old standards were fairly closely adhered to.*<sup>10</sup>

Whether such studies do in fact tell much about domestic brewing 1000 years ago they are very informative about the variations and the possibilities which farmers and their wives uncovered in making beer. There were significant differences from region to region and even district to district in Norway in equipment used and in the additives which gave the beers their unique tastes. Beer was often made for special occasions or rituals and for such events specific types with certain ingredients were often made. The equipment was usually made of wood, a copper brewing kettle being a definite luxury. Strainers were made of straw or twigs, often from a special tree to lend a certain taste. Brewers in some parts of Norway put in juniper extract which may have superseded alder bark as an additive. Farmers in the nineteenth century apparently shared yeast, trading strains since storage was a serious problem. The entire process had something of a mystery about it since the brewer could control temperature and quality of ingredients only with great difficulty. Some brewers approached

the process with a religious earnestness, using signs and symbols to protect the brew from contamination by evil spirits. Special brews like the Christmas ale required special preventative measures. Certain times of the year were thought to be bad for brewing, some good. The scale of brewing was typically small, enough for the household. For special occasions such as religious feasts or weddings brewers might cooperate in a common enterprise.<sup>11</sup>

Brewing on a large scale and on a regular schedule began in Benedictine monasteries and that was not true of only Scandinavia but of all of northern Europe. In the Carolingian period the new large monasteries got brewhouses next to their bakeries. The two both used yeast and both needed temperatures above about 22 degrees Celsius. The monks had to have large supplies of beer not only for the brothers but also for the guests which they were required to take in under their Rule.<sup>12</sup> Monasteries sometimes brought in beer, taking it from their tenants as part of the tithe. But more typically they found it better to produce the beer themselves and certainly by the early fourteenth century in Bavaria as much as in Scandinavia monasteries had their own brewhouses. The monastery at Selje near Bergen dating to the early twelfth century had a brewery side-by-side with the kitchen while another monastery in the area had baking and brewing carried out in the same building. In the mid-fifteenth century at the monastery of Vadstena in Sweden the bishop ordered the bakery and kiln to be attached to the old brewery which probably dated from the monastery's foundation around 1380. In 1595 the largest vat at the monastery could hold 1,200 litres so production was on a large scale.<sup>13</sup> It may be the commercial brewing in the towns of Scandinavia developed from the example of these Benedictine monasteries established from the eleventh century on but the more likely source of inspiration for northern development was the import of beer by ship from the Hanse towns of north Germany.

Homeowners in German towns brewed their own beer, a right granted to citizens in many towns by the Emperor Henry I. They began to sell their surplus first to fellow citizens and then in the port towns to ships for use on board and also for sale in foreign ports. The logical market for those exports from towns along the North Sea coast of Germany was the Netherlands, a common destination for their ships and a region with both a high level of urbanization and relatively high incomes. Before exports could grow though the beer itself had to be changed. The typical product of domestic brewers, flavoured with herbs of various kinds, could not maintain its quality during a lengthy sea voyage. The addition of hops however made beer last for up to one year and so transformed it into a commodity of international commerce. Hops were known in Carolingian times, grown on the lands of monasteries. Adelard of Corbie and later Hildegard of Bingen mentioned hops as an ingredient in brewing. The use of hops spread slowly however. While north German towns had hop gardens subject to tax and were carrying on a trade in hops by the early thirteenth century it appears that hops were not grown at all until about 1200 in Upper Austria and perhaps even later in parts of Bavaria.<sup>14</sup> Scandinavia was even slower in adopting hops for use in beer. In the fourteenth century north German towns had brought in hops from Thuringia, from villages in Poland and from the Mecklenburg countryside. The towns by the early fourteenth century had set up special markets for the good.<sup>15</sup> As the production of beer increased so too did the trade in hops.

The Low Countries market for German beer grew slowly in the thirteenth century and then much more rapidly in the fourteenth. Flat-bottomed cogs, originally built for coastal travel, had by that time received a keel. That and other changes made them better sailors, better able to carry more goods and also to stand out to sea. The new design changed cogs from coastal boats into seagoing ships. It took some time for shipbuilders and sailors to fully exploit the potential created by that technical advance. Hanse traders using their much improved cogs after 1200 made more and more frequent trips along the Frisian coast, find-

ing a variety of goods to carry in both directions. The higher quality of beer from Bremen and from Hamburg compared to the local product made it an increasingly important trade good. Locally brewed beer could not compete with the hopped beer from the Hanse towns. The same pattern would recur later in other export markets including Scandinavia.

The rising volume of the beer trade to the Low Countries caused the Count of Holland to prohibit the import of beer in 1321. He was concerned about a loss of tax income since he levied a charge on the production of beer and German beer was replacing the native product. The Count had to lift the ban on imports in 1323 but he did replace it with an import duty on Hamburg and eastern beer. He also allowed domestic brewers to go over to making their product with hops. Hamburg became the principal supplier of beer to the Low Countries through the rest of the fourteenth century and the volume of beer shipped from there continued to rise. The industry became an important one to the town and to the Hanseatic League. It was subject to many specific regulations, most directed at maintaining the quality of the product. By the 1370's Hamburg needed between 21,000 and 42,000 registered tons of shipping just to move beer to the Low Countries.

In the fourteenth century the volume of hopped beer produced in Dutch towns rose as well. As the quality of Holland beer improved it slowly replaced German imports. The brewing industry which grew up in the towns of Delft, Haarlem and Gouda was one of the major contributors to the economic success of Holland in the fifteenth century. There were already signs of trouble for German exports in the new brewing ordinance in Hamburg in 1411. After a final period of prosperity in the 1420's exports to the Low Countries from north German towns began a steep decline. The rising taxes on the import and sale of German beers like the hefty excise tax the Count of Flanders imposed in 1494 created even greater disadvantages. At its height some 50% of Hamburg exports went to Holland. A small proportion went to Flanders.<sup>16</sup> But the rest went to other markets along the North and Baltic Seas. When sales in the Low Countries fell off after 1430 Hamburg brewers and Hanse brewers and shippers in general had to look elsewhere for export markets. The German towns themselves set up strict prohibitions against the import of beer from other members of the Hanseatic League. The expansion of brewing and especially the brewing of hopped beer in southern Germany in the fifteenth century closed off that potential market. So as a new export market Scandinavia was the logical choice.

Wismar had already established a foothold in the North. In 1351 King Magnus of Sweden had granted toll freedom for Wismar beer at Kalmar. Denmark proved a harder market to enter. King Eric in 1283 issued a prohibition against the import of any German beer. The Scania herring fishing grounds were a center of shipping, a source of a critical export good for Hanse and especially Lübeck traders. But the fishermen's camps along the shore near Falsterbo which were legally inside the kingdom of Denmark took only small quantities of beer at the end of the fourteenth century, that is at a time when the herring catch was relatively large. By 1466 the Danish prohibition had been changed to a tax, a tax which was a rather heavy one. Bergen in Norway proved to be an important market for Wismar beer well before 1400. Consumers were mostly the German merchants in the sizeable and highly influential colony there. They controlled virtually all of the overseas trade. Shipping beer to them from north Germany went on throughout the fifteenth century.<sup>17</sup> The north German port towns specialized, the division of markets going back to the late fourteenth century if not earlier. Hamburg sent its beer principally to the Low Countries, England and the towns of the lower Rhine. Gdansk took care of Estonia, Latvia and Lithuania. The Wendish towns were producers for Scandinavia with Rostock, Stralsund but especially Wismar over time superceding Lübeck. Beer from Lübeck and also from Lüneburg on occasion even got shipped through Hamburg to the North.<sup>18</sup>



The ability to invade successfully overseas markets depended on maintaining quality and cost control at home, on the ability to keep governments from erecting insurmountable barriers to imports and on the ability to keep shipping costs down. Beer was after all 90% water and shipping added significantly to the delivered price, even shipping over a short distance. The cost of shipping beer fell relatively in the fifteenth century. At the end of the fourteenth century shipbuilders improved the design of the cog again, this time by borrowing features from the hulk. That type had an almost egg-shaped hull and lacked a keel. It too by the fourteenth century had a single mast with a single square sail. The result of merging the two types was a new and more versatile cargo carrier better able to ride at anchor and weather storms but also better able to carry more goods for the same or less cost. Having such vessels was important to German traders' being able to sell beer in Scandinavia.<sup>19</sup> The Hanse towns dominated trade to the northern kingdoms in the fifteenth century using political and military as well as commercial pressure to maintain their position. With the trading links established and with effective relatively low cost transport available beer was easily added to the cargoes going north.

In the course of the fifteenth century the quality of beer for export seems to have gone down. In 1481 for example the town government of Bergen complained to their counterpart in Wismar that brewers had over time decreased the quantity of malt used to make each brew. In 1466 Denmark had imposed a duty of 4 shillings per barrel and set the sale price of German beer at 18 shillings per barrel so the tax was 22% of the selling price. At the same time the king of Denmark had prohibited import of German beer into certain towns. Foreign beer could not enter the Malmö fall market under a 1489 regulation, for example. There was another set of Danish regulations on imported beer in 1491. Wismar which brewed principally for the North had in around 1400 some 100,000 hectolitres for export each year but by the end of the fifteenth century overseas sales had fallen to between 30,000 and 40,000 hectolitres. The town council went so far as to legislate against the breaking up of breweries, many being forced to close in the face of falling sales.<sup>20</sup> The decline in sales for all the towns was to a great degree a reflection of the declining political power of the Hanse. The League could no longer force trading conditions onto the governments of western and northern Europe. The Hanse tried to pressure Scandinavian governments into concessions. The League prohibited the export of beer to Denmark in 1363, 1367, 1368, 1422, 1464, 1477 and 1490. In the fourteenth century the restrictions were combined with military action and led to success. In the fifteenth little came of the embargoes. The same was true of efforts to restrict the export of hops from, for example, Wismar. In the sixteenth century on the other hand Denmark subjected Wismar beer to only a relatively low import duty. The favourable treatment may have been because of a connection between the Danish royal house and the ducal house of Mecklenburg.<sup>21</sup> The better treatment was reflected in the quantity of Wismar exports.

It is difficult to estimate the volume of beer that German shippers sent to Scandinavia. It appears that imports probably rose overall in the fifteenth century compared to the previous one hundred years. There were variations however and possibly some decline toward the end of the century. In the sixteenth century the volume appears to have continued to increase and that despite the growth of brewing in the towns of Denmark, Norway and Sweden. Once it was clear that a market existed Scandinavians began to make their own hopped beer commercially just as the Netherlands had before them, imitating the imported product. The growth in population in the sixteenth century and the increased urbanization which accompanied that growth created an improving market for domestically produced beer but the same factors were advantageous for producers and shippers in northern German towns. The commerce in beer did not disappear in the face of growing Scandi-

navian production. Consumption of beer per person appears to have risen in the second half of the sixteenth century as the price of grain went up faster than the price of beer, another reason for the ability of the beer trade to hang on. North German towns still found it possible to send grain through a manufacturing process and export the finished product, in this case beer, instead of exporting the grain itself. There were clear signs of contraction in brewing in Hamburg and other Hanse towns throughout the sixteenth century though. Whereas in the previous century towns such as Hamburg regulated the grain trade for the benefit of the brewers the tendency was increasingly to show greater concern for native consumers of food grains than for the export of beer. The Scandinavian market continued to be the reserve of the Wendish towns. In 1577–78 over 93% of beer imported into Bergen came from those towns. In 1550 Bergen imported 11,400 barrels of beer while about 1580 the figure was down to 5,400. Wismar still had 50 brewers in 1560 but with a lightening of the Danish beer excise by 1592 the number was up to 120. Production rose from an annual average of 80 to 90,000 hectolitres in the period 1560/1600 to between 100,000 and 120,000 hectolitres per year by 1618. The number declined through the rest of the seventeenth century though. In a statement of 1579 Wismar said it was its task to supply Norway, Denmark and Sweden with malt and with beer. That function did not disappear. Even in the seventeenth century Wismar still set the dates for exporting of beer to coincide with the peak of activity in the herring fishery in Scania. Wismar exports to Sweden appear to have risen in the seventeenth century, aided by reductions in tolls. By 1664 Sweden was Wismar's biggest export market. In 1610 though 55% of Stockholm imports came from Rostock, 33% from Lübeck and 8% from Greifswald. How much of that beer was produced in Wismar and then reexported from the other ports can not be known. Imports to Stockholm in 1620 were about 5,650 hectolitres, up dramatically from the approximately 1,150 hectolitres of 1550. There was also a rise in exports to Scandinavia from Gdansk, partially perhaps because of consumption in the North of Danziger or Jopenier, a heavy thick very expensive brew recommended largely for medicinal purposes. Mumme, originated in Braunschweig, was another expensive beer of high quality which commanded a premium price. Brewers in other towns imitated it and in the seventeenth century Wismar mumme sold to the courts of Sweden and Denmark. In 1623 king Christian IV of Denmark had to rescind his universal prohibition on the import of beer made two years before but he kept the restriction on imports of mumme.<sup>22</sup>

The first mention of hops in Sweden is in 1296. The earliest record of hops being grown in Finland comes from 1249. The plant was brought in by Cistercian monks. In the fourteenth century brewers made hopped beer alongside beer made with *pors*, a combination of herbs dominated by myrtle and very similar to *grut* used earlier in German towns especially in the Rhine Valley. Both crown and church tried to promote cultivation of hops in Norway in the fifteenth century. It became an export good for Sweden in the fifteenth and sixteenth century, forming for example 14% of total exports in 1491. With the raw materials present it is not surprising that commercial brewing began in Scandinavia. Records of the new breweries are best for those established by the government. Gustavas Vasa for example set one up at Uppsala in about 1540. It was to make beer in the Hamburg style and also to make Danziger beer. There was a brewery in Stockholm castle at an even earlier date. In 1554 it produced over 16,000 hectolitres of beer, virtually all of it for the consumption of castle residents which included the court. There were private, that is non-royal breweries in the period as well but little information about them has survived. A campaign beginning in the middle of the sixteenth century against drink worked against the growth in beer sales. Gustavas Vasa also laid down regulations for the production of beer in 1558 setting the types to be brewed, the proportions of ingredients and the prices. Olaus Magnus in his »Historia de gentibus septentrionalibus« published in Rome in 1555 described the brewing process in the North.

The regulations, the description as well as the changes made in brewing in Sweden and Finland in the sixteenth century all indicate that the impetus for the rise of brewing and the technology used came from Germany and especially from north German towns which exported beer by ship to Scandinavia.<sup>23</sup>

The adoption of hops as the principal flavouring agent in beer as well as the cultivation of hops was brought into Scandinavia from Germany. Drinkers in western Norway and especially around Bergen prefer beer with a relatively large quantity of hops, probably as a result of German imports into Bergen which had to be strong in hops to maintain quality during the sea voyage from Wismar or other Wendish towns. In some rural areas, far from such influence, beer was brewed with no hops and in fact with no flavouring at all.<sup>24</sup> The start of commercial brewing in Scandinavian towns was probably in imitation of practice in the towns of the Hanseatic League. The process of adopting that technology was a slow one and surprisingly so since, if literary evidence is to be believed, a great deal of beer was drunk in Scandinavia. 1558 regulations at Stockholm Castle put daily consumption at 4.5 litres of beer for each person and that figure was not, compared to other similar data, excessive for the period.<sup>25</sup> The delay in going over to commercially brewed hopped beer may have been a result of the success of domestic brewers through much of the Middle Ages, producing beer of reasonable quality and strength using other herbs and traditional methods. It could be that Scandinavians in general were reluctant to accept technical change though that seems illogical in the face of the ability to absorb other techniques from the South. It could be that the pace of advance was slowed by the poor internal communications which typify Scandinavia. Markets for all goods including beer were usually limited. Towns were few and not large with virtually no exceptions. Large scale production often did not make economic sense so retaining traditional methods did make sense. It was possible to ship beer economically by water but German traders had established themselves at sea and even more firmly after about 1400 with their more efficient cogs. They continued to build and use cargo ships of the latest and most advanced design in the sixteenth century. Full-rigged ships came first to German ports. That new type which originated probably in Iberia used the typical Mediterranean construction method of setting up ribs first and then having hull planks tacked on to the ribs. Strength came from the internal skeleton. This was very different from traditional building methods in the North where hull planks were not flush but overlapped and strength came from those planks. Scandinavian boatbuilders seem to have retained the older style especially for fishing boats and small cargo vessels. Their adherence to older methods often gave German shippers a competitive advantage in moving goods, including beer. So it was difficult for Scandinavian producers to compete effectively. German brewers in Lübeck, Wismar, Rostock and elsewhere had the capacity and the ability to produce high quality beer in sufficient quantities to satisfy the Scandinavian market. Those producers also had the advantage of access to the principal raw material for making beer, grain. The developed grain markets of the Hanse ports, the shipping network they had developed always meant they could get barley or wheat more easily than Scandinavian brewers. Norway even had to import grain in the sixteenth century from Germany to make bread so it is not likely that Norwegian brewers with ambitions to compete in urban markets would have been able to get the grain they needed at prices anything like what their counterparts in the Wendish towns paid. Those north German brewers even paid less for their grain in the sixteenth century than brewers in Bavarian and other south German towns. Bergen in Norway even had to go so far as to import malt, brought in by members of the Hanseatic League. What is more in the fifteenth century beer prices went down and then went up again in the next century but not as fast as the price of grain. Profit margins of all brewers were squeezed and that made entry into commercial brewing all the more difficult



even in Germany not to mention in Scandinavia where potential markets were limited and brewers had to face mastering new techniques.<sup>26</sup>

Beer may have been a very popular and important drink in Scandinavia in the Middle Ages but it was beer in a relatively simple form produced at home and on a small scale. Scandinavians were slow to change, slow to adopt new brewing technology and slow to increase the scale of their production. The size of the market combined with political and economic reasons to slow the pace of change. While Scandinavia may have been advanced in ship-building and seafaring in the early Middle Ages for the years up through the sixteenth century the area was technologically backward compared to western and much of central Europe. That was certainly the case with brewing. While Scandinavian ships played a critical role in creating the Viking Age it was at the same time that technical advances were taking place in France and Germany which would lay the foundation for making Scandinavia not similar to the rest of Europe but rather making the region peripheral to Europe's economy. The ethnographic studies done in the second half of this century show how slow Scandinavians in the countryside were to change their ways of brewing. Even in the late nineteenth century, after the rapid expansion of industrialized brewing, Norwegian farmers, for example, except in areas around the largest towns, still held on to their old ways. From the middle of the nineteenth century Scandinavian brewers were among the most progressive in the world. J.C. Jacobsen's Carlsberg brewery was one of the first to adopt refrigeration. It was the first brewery in the world to appreciate the implications of Pasteur's discoveries about yeast and so led the industry by being the first to have a biology laboratory in the brewery.<sup>27</sup>

Commercial brewing for sale over long distance began in the thirteenth century in northern Germany. The addition of hops created a trade good and a trade in beer. German shippers carried the product to new markets one after the other. The hopped beer-brewing industry spread from there in the course of the fourteenth and fifteenth centuries to the Netherlands, to England and to the rest of Germany. Only in the sixteenth century did the industry begin to develop in Scandinavia. When in the seventeenth century beer consumption fell in the face of competition from distilled alcoholic drinks and then coffee, tea and cocoa there was only a small commercial industry left in Scandinavia. That region missed the boom in brewing at the end of the Middle Ages known in Germany and much of western Europe. German shippers played a major role in slowing the development of Scandinavian brewing. Scandinavia as a result did not get a large and thriving industry until the next period of growth, the brewery boom of the late nineteenth century.

## Notes:

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- 4 Nils Lund, ed.: *Two Voyagers at the Court of King Alfred The ventures of OTHERE and WULFSTAN together with the Description of Northern Europe from the OLD ENGLISH OROSIUS*. York, 1984, p. 23.
- 5 M. Hoffmann: *5000 Jahre Bier*, p. 44; Odd Nordlund: *Brewing and Beer Traditions in Norway. The Social Anthropological Background of the Brewing Industry*. Oslo, 1969, p. 36; Matti Räsänen: *Vom Halm zum Faß, Die volkstümlichen alkoholarmen Getreidegetränke in Finnland*. In: Kansatieteellinen Arkisto 25, Helsinki, 1975, p. 107–8; Harald Thunæus: *Ölets historia i Sverige*. Stockholm, 1968/69. Volume I: *Från äldsta tider till 1600-talets slut*, p. 13, 42–46.
- 6 Matti Räsänen: *Vom Halm zum Faß*, p. 68.
- 7 Odd Nordlund: *Brewing and Beer Traditions in Norway*, p. 2–5, 15.
- 8 Odd Nordlund: *Brewing and Beer Traditions in Norway*, p. 158.
- 9 Matti Räsänen: *Vom Halm zum Faß*, p. 13, 64.
- 10 Odd Nordlund: *Brewing and Beer Traditions in Norway*, p. 283.
- 11 Wolf Bing: *Hamburgs Bierbrauerei vom 14. bis zum 18. Jahrhundert*. In: *Zeitschrift des Vereins für Hamburgische Geschichte*. 14, 1909, p. 211; Odd Nordlund: *Brewing and Beer Traditions in Norway*, p. 7–9, 82, 126–134, 173–193, 229–236, 244–265, 270–274; Matti Räsänen: *Vom Halm zum Faß*, p. 40.
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